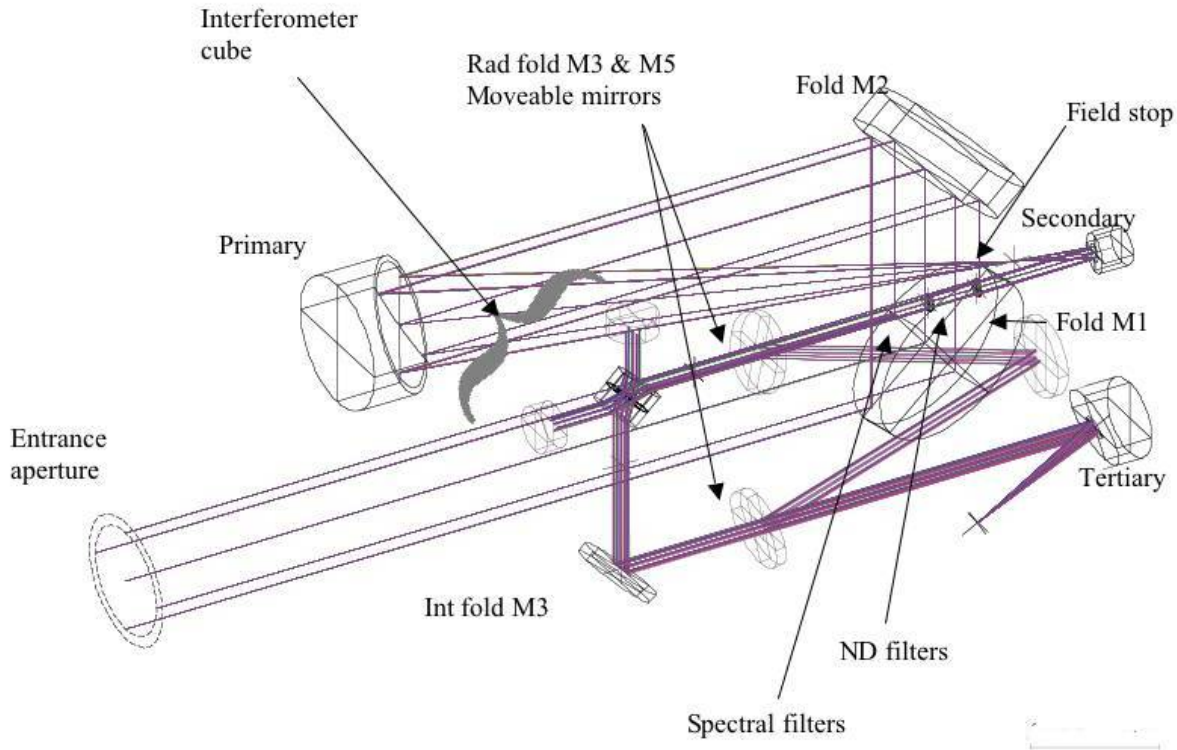
STRATEGIC PLAN 2004

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards and Technology
Physics Laboratory

OPTICAL TECHNOLOGY DIVISION



BXRII -Design

TABLE OF CONTENTS

	Page
STRATEGIC PLANNING PROCESS AND IMPLEMENTATION	**3**
VISION, VALUES, MISSION & GOALS	**5**
DIVISION PROGRAM RESPONSIBILITIES	**6**
OPTICAL THERMOMETRY AND SPECTRAL METHODS GROUP, 844.03	**7**
OPTICAL PROPERTIES AND INFRARED TECHNOLOGY GROUP, 844.04	**9**
OPTICAL SENSOR GROUP, 844.05	**11**
LASER APPLICATIONS GROUP, 844.06	**13**
CONCLUDING REMARKS	**15**
APPENDIX A: ACRONYMS	**16**

Strategic Planning Process and Implementation

This strategic plan defines the scope and intent of the Division's research and measurement programs. The purpose of this document is to provide a unified view of the Division's purpose and identify the direction of its future activities for the Division's colleagues, customers, and other stakeholders. A statement of the Vision, Values, Mission, and Goals of the Division's activities has been adopted after extensive consultation with the Division's staff. Each Group in the Division has developed programs and projects along with a set of tactical goals that best enable them to address the Division's strategic objectives. These projects and programs, and the degree to which they are accomplished, provide a partial basis for evaluation of the success of the Groups and Division in achieving the objectives outlined in the strategic plan.

The ultimate success in meeting the identified objectives of this planning process depends upon effective implementation of the plan in all aspects of the Division's operation, and in developing an appropriate metric to ascertain if the Plan's objectives are being met. Strategic planning is a dynamic activity and hence we will continue to evolve new ideas to design a technical framework to better meet the needs of the Division and its stakeholders. The evolution and modification of the strategic plan will be based upon customer feedback and changes that we perceive in the internal and external environment that affect our operation.

To be optimally successful, it is necessary for all Division members to gather ideas for change from customer feedback, identify new opportunities, recognize potential problems, and communicate them to management for appropriate consideration. We will judge our progress in achieving the goals outlined in our plan by evaluating the quality, quantity, and appropriateness of our products, by monitoring the increasing value of our services as perceived by our customers, and by noting the national and international recognition we receive for our leadership in our chosen arenas of activity.

The strategic plan serves as the foundation for evaluating new projects for funding and promotion within NIST. The strategic plan will also serve as a basis for designing individual performance plans. To effectively achieve this result, it will be necessary for each staff member's performance plan to explicitly map his or her performance evaluation criteria onto the objectives of the strategic plan in a direct and cogent manner. The placement of everyone's research programs within the context of the Division's strategic plan will assist us in discussing the relevance of our programs with visitors, review panel members, and other NIST staff members. The degree to which an individual's accomplishments for a performance cycle assist the Division in meeting its strategic objectives will be a major factor in the performance evaluation process. While the strategic and tactical goals will be updated frequently, discussions of the plan and suggestions for revision can occur at any time, and consequently, interested stakeholders in the Division's health should immediately make their suggestion known to the Division's management team. With everyone's cooperation, the quality of our research, services, and staff expertise can improve as a result of focusing our efforts as described by the strategic plan. This improvement will result in increased recognition of our efforts from NIST management and from our colleagues throughout the world.

A key ingredient of the Division's strategic planning is to ensure that the planning maps directly onto the strategic plan for NIST and the Physics Laboratory. In particular, NIST has identified some strategic focus areas, Health Care, Nanotechnology, Information Management, and Homeland Security that will be targeted for future growth and development. It will be a challenge for the division staff and management to appropriately steer our research and program interests to overlap the areas identified in the NIST strategic plan while at the same time attending to the needs and demands of our customers in our traditional support areas. The Laser Applications Group has made dramatic program shifts in the last several years into new areas that directly relate to the NIST strategic focus areas and while this type of reprogramming is not possible in every group, we should take advantage of opportunities when they arise to start new programs that are relevant to the NIST strategic focus areas. These considerations will certainly be an ingredient of decision-making at the Division level and should become a part of decision-making within the groups.

As a part of any strategic planning process, everyone should evaluate their activities' relevance to the institutions plans to ensure effective integration into the success of the organization. Growth, adaptation and flexibility underpin the basis for success in the future of NIST and other organizations and consequently must be a part of our strategic planning.

Vision, Values, Mission and Goals

Vision: The Optical Technology Division will be the world leader in providing definitive measurements, data, and research for optical radiation reliant technologies crucial to the U.S. Economy and for the benefit of society.

Values: The Optical Technology Division embraces the core NIST values and best practices and, additionally, strives to sustain the highest quality efforts in serving its customers to promote U.S. competitiveness.

Mission: The Optical Technology Division, by advancing knowledge and expertise in targeted areas of optical technology, will provide the highest quality services, technical leadership, and measurement infrastructure to promote the U.S. Economy, support the public welfare, and underpin the optical technology necessary for Homeland and National defense.

Strategic Goals:

- Perform research and development to advance measurement science to maintain the Nation's primary SI standards for the candela and kelvin and associated photometric, colorimetic, pyrometric, and spectral radiometric quantities.

- Improve the accuracy, range, and utility of optical technologies by conducting long-term strategically directed research in optical, photophysical, and photochemical properties of materials, in radiometric and spectroscopic techniques and instrumentation, and in applications of optical technologies in all pertinent aspects of the economy.

- Build and maintain state-of-the-art measurement infrastructure, spanning the ultraviolet through the microwave spectral region, to meet the emerging needs of Federal and Local Government for defense and civilian requirements and to meet the needs of the U.S. technical and industrial establishment.

- Support international efforts through the Consultative Committee on Photometry and Radiometry (CCPR) by participating in appropriate intercomparisons designed to secure worldwide acceptance of U.S. products and practices that are reliant upon NIST measurements.

- Maintain a management structure and environment responsive to and accommodating of customer and institutional needs and which enable, develops, and elicits the full scientific and technical potential of each staff member.

Division Program Responsibilities

The groups in the Division cooperative in achieving the objectives of the Division's strategic plan by arranging their activities into programs and projects often with participation from several groups. The project structure focuses talent and resources to effectively meet the needs of NIST and its customers, and provides a convenient structure to assess program performance. When appropriate, programs are redirect to meet new national needs in optical technology. Presently, the Division's activities fall in to the following 5 program areas:

1. Development and dissemination of absolute radiometric, photometric, and colorimetric standards;

2. Development of optical radiation measurements and standards to meet national needs in defense and homeland security, climate change research, and manufacturing;

3. Advancement of the experimental and theoretical knowledge of optical properties of materials from the ultraviolet to the far-infrared to aid the development of improved optical measurements;

4. Development of advanced optical techniques with application to NIST Strategic Focus Areas of Homeland Security, Healthcare, and Nanotechnology, and other national priority areas;

5. Participation in national and international standards activities and organizations to ensure the quality and world-wide acceptance of U.S. optical radiation measurements and standards thus enhancing U.S. productivity, trade, and quality of life.

Through these programs, the Division meets the needs of the lighting, imaging, automotive, electronics, health and medical, biotechnology, nanotechnology, energy, chemical, and other industries dependent upon optical measurements. The Division also provides measurement support for National needs in solar and environmental monitoring, for health and safety concerns, and for the aerospace and defense industries. The Division has advanced programs in laser spectroscopy, terahertz and infrared spectroscopy, near-field scanning microscopy, and synchrotron radiation to provide new insight into physical, chemical and biological phenomena and to provide new tools for measurement needs in industry and government. The Division has a responsibility to provide measurement and standards support services to other government agencies for the efficient and effective pursuit of their own missions. To this end, the Division develops collaborative projects with appropriate participation from other agencies such as NASA, NOAA and DOD, and as a result, develops facilities for calibration and other types of measurement support required by these agencies' particular programs.

Optical Thermometry and Spectral Methods Group (844.03)

In order to help meet and further the Division and NIST's strategic goals, the group performs the following activities in the Division's program areas:

- Maintains, improves, and disseminates the national scales for the spectroradiometric measurement of radiation sources and temperatures;

- Provides visible and ultraviolet spectrophotometry research and standards in reflectance, transmission, color, and appearance;

- Participates in national and international committees and intercomparisions to insure the acceptance of IS radiometric, radiance temperature, and spectrophotometric standards and measurements;

- Develops protocols for the calibration and validation of optical remote sensing instruments;

- Performs long-term research and maintains the infrastructure necessary to insure the advancement of optical thermometry, radiometry, and spectrophotometry measurement technology.

Near Term Programmatic Tactical Goals and Objectives:

Division Program 1

1. Develop new detector-based scales for spectral radiance and radiance temperature. [Howard Yoon, Carol Johnson, and Charles Gibson]

2. Establish a facility at SURF III for spectral irradiance calibration of sources from 200 nm to 400 nm. [Howard Yoon and Charles Gibson]

3. Construct new pyrometers to measure blackbody temperatures based on absolute detectors and validate their performance by providing a new measurement of the gold freezing point with a $k = 2$ uncertainty of 40 mK or better. [Carol Johnson, Howard Yoon, and David Allen] (8)

4. Investigate the utility of eutectic blackbodies as fixed-points for radiation temperature measurements. [Howard Yoon and Carol Johnson]

Division Program 2

1. Work with the remote sensing and environmental monitoring community to develop methodology and artifacts to calibrate radiometers, spectrometers, and other optical instruments used in their measurements. [Carol Johnson, Steve Brown, Ted Early, Joel Fowler, and David Allen]

2. Develop a plan to provide improved measurement capabilities to industry for the temperature processing of Si wafers after lithographic exposure. [David Dewitt and Ben Tsai]

3. Develop capability and methodology to measure the temperature of real-time processes such as machining of materials and temperature changes produced upon stressing materials. [Howard Yoon and Carol Johnson]

4. Develop and work with the heat flux measurement community to validate measurement protocols and develop new standard methods for heat flux calibrations. [Dave DeWitt and Charles Gibson]

Division Program 3

1. Develop a response to industry, academia, and governments needs for improved measurement and standards in color and appearance, fluorescent color, and BRDF (bi-directional distribution function) of materials. [Ted Early, Maria Nadal, and David Allen]

2. Provide measurement services for calibrating and characterizing both established and novel colored objects, including those, which rely upon absorption, metallic, and pearlescent pigments. [Maria Nadal and Ted Early]

Division Program 4

1. Develop spectroscopic instrumentation and theories to apply advanced spectroscopic instrumentation to the detection of chemical and biological agents for homeland security, to the measurement of chemical concentrations and temperatures in etching plasmas, to the investigation of the dynamics of complex biological systems, and to the determination of the fundamental spectra of molecules of importance in atmospheric, biological, combustion, and plasma chemistry. [Gerald Fraser, Walter Lafferty, Marilyn Jacox, Toni Litorja, Jon Hougen, and Alan Migdall]

2. Develop and apply single-photon sources to problems in radiometry and in quantum communication, cryptography, and computation. [Alan Migdall]

3. Advance capabilities in mid- and near-infrared radiometry, including the development of a new high accuracy mid-to-near infrared spectroradiometer, for the calibration of infrared arrays and sensors, blackbody sources, and radiation thermometers. Demonstrate infrared capabilities by providing an improved measurement of the Zn freezing point. [Ben Tsai, Toni Litorja, Howard Yoon, and Carol Johnson]

Optical Properties and Infrared Technology Group (844.04)

In order to help meet the Division and NIST's strategic goals the group performs the following activities:

- Establishes and disseminates primary measurement scales for Low Background Infrared Radiation Measurements (LBIR) by improving the state-of-the art in electrical substitution radiometry and by providing transfer standards to achieve higher accuracy and sensitivity;

- Establishes and disseminates measurement scales for emittance, transmittace, and reflectance of materials in the near-to-far infrared spectral region;

- Develops superconductor materials for optical sensor application; and provides research and development of optical materials used in low and ambient thermal background environments;

- Develops theoretical models to predict behavior of optical materials.

Near Term Tactical Goals and Objectives:

Division Program 2

1. Characterize the 10 cm collimator upon delivery and calibrate the improved BXR I at NIST using 10 cm collimator, and continue the development of BXR II with spectral capability. [Adriaan Carter and Jung Co.]

2. Acquire new space for the LBIR Facility and start building a Multipurpose Low Background Calibration Chamber for spectral calibrations of sources and detectors. [Adriaan Carter and Raju Datla]

3. Calibrate TXR in the MBIR chamber. Start developing FTXR for NPOESS. [Joe Rice and Jorge Nierra]

4. Lead the multi-year program between NPOESS and NIST that serves to provide NIST verification of various radiometric scales used within the NPOESS program. [Joe Rice]

5. Using a combination of the TXR, ESB, IR SIRCUS, and FTIRs as necessary, develop a detector-based thermal-infrared extended-area radiance scale, apply it to the calibration of the TXR and eventually to the FTXR, and compare it to the source-based radiance scale used for previous calibrations of the TXR. [Joe Rice]

6. Provide support to development of facility for blackbody characterization using Fourier-Transform spectral comparator at the Navy Primary Standards Lab, including delivery of system and software components. Complete characterization of uncertainty at NIST for evaluation. [Leonard Hanssen, Sergey Mekhontsev, and Vladimir Khromchenko]

Division Program 3

1. Construct IR Spectrophotometry Calibration Service Facility. [Leonard Hanssen]

2. Complete construction of an IR Emittance Measurement Facility (including direct and indirect capabilities). Begin characterization of materials of interest at elevated temperatures > 500 K. [Leonard Hanssen, Sergey Mekhontsev, and Alexander Prokhorov]

3. Oversee Optical Properties of Materials Consortium (OPMC); organize meetings, workshops, and member visits to NIST. [Leonard Hanssen]

4. Explore theoretical research in the modeling of optical properties of materials, including linear and non-linear optical constants, photoelectron spectroscopy, X-ray absorption, fluorescence and scattering, and far-infrared optical activity. [Eric Shirley]

5. Setup CO_2 laser facility for BRDF measurements and detector characterization in new laboratory. [Leonard Hanssen]

6. Lead Monte-Carlo ray-tracing model development and application to radiometric problems of interest including use of integrating spheres in reflectometers and uniform sources. [Leonard Hanssen and Alexander Prokhorov]

7. Make ultraprecise measurements of the index-of refraction at 193 nm and 157 nm for DUV immersion lithography in collaboration with John Burnett of Division 842 to serve the semiconductor industry. [Simon Kaplan]

8. Make necessary measurements of the index-of-refraction of glass to regenerate the SRM 1822 for forensic science. [Simon Kaplan]

Division Program 4

1. Lead a project to investigate the application of IR SIRCUS to the metrology of commercially available IR cameras. [Joe Rice]

Division Program 5

1. Lead the inter agency effort of NASA, NOAA, NPOESS and NIST for improving radiometric calibration of satellite sensors for measuring global climate change. [Raju Datla]

Optical Sensor Group (844.05)

In order to help meet the Division and NIST's strategic goals the group performs the following activities:

- Establishes, improves, and disseminates the measurement scales for absolute spectral responsivity of optical detectors in the spectral region from 200 nm though 20 μm, in radiant power, irradiance, and radiance geometry;

- Establishes, improves, and disseminates the national measurement scales for the SI base unit, the candela, and other photometric units including the lumen and the lux, as well as for color quantities of light sources;

- Performs research and development of optical detectors and measurement methods to meet the needs in specialized applications in radiometry; photometry, colorimetry and spectrophotometry;

- Participates in national and international committees and intercomparisons in the area of radiometry, photometry, and colorimetry (of light sources).

Near Term Tactical Goals and Objectives:

Division Program 1

1. Develop a new generation high-accuracy cryogenic radiometer (HACR 2) and realize the radiant power scale with reduced uncertainties in the UV to IR region. [Jeanne Houston and Joe Rice (Group 4)]

2. Develop and improve the facility for Spectral Irradiance and Radiance Calibration using Uniform Sources (SIRCUS) to provide the spectral irradiance and radiance responsivity scales in the range from 200 nm to 2.5 μm. [Steve Brown, George Eppeldauer, and Keith Lykke (Group 6)]

3. Maintain and improve the scale of spectral power responsivity in the UV to near IR region and provide detector spectral responsivity calibration services. [Tom Larason and Jeanne Houston]

4. Maintain and improve the photometric units (candela, lumen, lux, cd/m^2, lux·s) and color temperature scale (kelvin), and provide photometric calibration services. The current focus is to expand capability for calibration of LEDs. [Cameron Miller and Yuqin Zong]

5. Realize the total spectral radiant flux scale in the near UV to visible region to provide traceability for measurements of luminous flux, radiant flux, and color of light sources (including LEDs) in industry using integrating sphere systems with a spectroradiometer. [Yuqin Zong]

6. Provide Short Courses on Photometry, Spectroradiometry, and Radiation Thermometry. [Coordinators: Cameron Miller for Photometry, Howard Yoon (Group 3) for Spectroradiometry, and Carol Johnson (Group 3) for Radiation Thermometry]

Division Program 2

1. Develop novel, spectrally-tunable LED standard sources used as calibration sources for ocean color measurement as well as for general spectroradimetric, photometric, and colorimetric applications. [Steve Brown, George Eppeldauer and David Allen (Group 3)]

2. Develop a state-of-the-art retroreflectance measurement facility for calibration of various traffic control materials including retroreflective road marking materials to meet the needs in highway transportation community. [Cameron Miller and Todd Heimer]

3. Develop irradiance responsivity calibration methods and procedures for the near-IR and mid-IR range to calibrate anti-tank weapon systems and target simulators. [George Eppeldauer and Howard Yoon (Group 3)]

4. Develop the IR SIRCUS facility to establish the spectral irradiance and radiance responsivity scales in the region from 2 μm to 20 μm to meet the military needs. [George Eppeldauer, Keith Lykke (Group 6), and Joe Rice (Group 4)]

Division Program 5

1. Coordinate and participate in CCPR Key Comparisons as well as other international intercomparisons (such as SIM). [Yoshi Ohno, Steve Brown, Tom Larason, and several other members of other groups]

2. Participate and take active roles in technical committees of CIE, CORM, ASTM, NCSL, and other international standardizing bodies. [Yoshi Ohno, Cameron Miller, Tom Larason, George Eppeldauer, Ted Early (Group 3), Maria Nadal (Group 3), and other members of other groups]

Laser Applications Group (844.06)

In order to help meet the Division and NIST's strategic goals the group performs the following activities:

- Develops and applies state-of-the-art laser diagnostics to industrial, environmental, and biological processes;
- Uses lasers with spectral coverage from terahertz to ultraviolet and time resolution to the femtosecond timescale to study chemical species and dynamics in biological, semiconductor, and other critical materials over length scales ranging from micrometers to nanometers to single molecules;
- Develops linear and nonlinear optical methods for the study of interfaces important in biology, biotechnology, catalysis, optoelectronics, molecular, and semiconductor electronics;
- Develops and applies synchrotron-based techniques for radiometry and for studies relevant to the photolithography industry.

Near Term Tactical Goals and Objectives:

Division Program 1

1. Construct new spectroradiometric facilities at the Synchrotron Ultraviolet Research Facility (SURF III) to extend and improve radiometric measurements in the UV and IR and to establish SURF III as an absolute source of synchrotron radiation (beamline 3). [Ping Shaw, Howard Yoon (Group 3), Bob Saunders (Saunders Enterprises), Al Parr, and Uwe Arp (Division 841)]

Division Program 2

1. Perform damage tests on photodetectors in hopes of finding the best detectors for a variety of users (beamline 4 on SURF III). [Ping Shaw]

Division Program 3

1. Develop the techniques of light scattering ellipsometry and Mueller matrix BRDF. Experimentally characterize scattering from interfacial roughness in dielectric films, from well-characterized particles on surfaces, and from special-effect pigments in coatings. Develop theoretical models for light scattering from these features. [Thomas Germer and Bruno Boulbry]

Division Program 4

1. Develop methods for characterizing THz pulses, cw THz, and interactions with materials; produce THz optical materials data, particularly for biological molecules such as DNA and proteins, where large-scale molecular motions such as protein folding correlate with absorptions in the THz frequency region. [Ted Heilweil, Matt Campbell (SPARTA, Inc.), David Plusquellic, and Karen Siegrist (Group 3)]

2. Develop multielement/channel IR and THz detection schemes for time-resolved spectroscopy and imaging. This and the above bullet include CBW-related Homeland Defense Measurements. [Ted Heilweil and Matt Campbell (SPARTA, Inc]

3. Expand NSOM application areas to include chemical and biological systems; extend NSOM capabilities to include polarization, spectral, and time-resolved measurements; use NSOM to study materials important in organic electronics and tissue engineering. [Lori Goldner, Jeeseong Hwang, and Jeff Krogmeier]

4. Use SFG to determine the structure, orientation, and dynamics of biomolecules such as proteins or co-enzymes in biological and biomimetic membranes; and to study the structure and dynamics of interfaces important to polymers, semiconductors and optoelectronics (e.g., thin gate dielectrics, metal layers, or liquid crystal alignment layers). [John Stephenson, Kim Briggman, Neil Anderson, Shelia Maness, and Clayton Yang]

5. Develop single molecule spectroscopy (e.g., fluorescence and Raman) as a tool for studying local chemical and physical environments, and for biological problems such as RNA binding dynamics or protein folding. [Lori Goldner, Jeeseong Hwang, Peter Yim, Xiaoyi Zhang, Meghan Carroll, Angela Hight Walker, Guangjun Cheng, and Danilo Romero]

Concluding Remarks:

The outline of goals and objectives that are presented in the individual group statements and the overall Division statement serve as an outline of the program directions and technical areas, which collectively we have identified, as important. It is worthwhile to emphasize some of the ideas expressed in the Division values statement as they underlie the basis for management decisions. The Division management team strongly feels that quality efforts and quality research products are the key elements in defining scientific success. Thusly, in order to deliver quality services and research output, it is the view of the management team that our individual staff contributions must be evaluated in terms of the quality of output with respect to their peers at other similar institutions throughout the world.

In addition to maintaining quality output for our customers, it is essential that we maintain and support world-class quality laboratory facilities. For example, at one time many of the calibration facilities in the Division had been allowed to fall into obsolescence and the quality of the calibrations were subject to question. During the last decade we have invested heavily in the reconstruction of most of our measurement support facilities. To maintain the strategic vision, values, and mission of the Division, it is essential that the quality of our measurement and research labs remain among the best in the world. It is a management goal to ensure that these facilities remain the best in the world and that they are staffed by the most able scientists obtainable. This fundamental goal will serve to underpin all management decisions including allocation of equipment money, the assignment of laboratory space, and the recruitment of new staff members. The quality of efforts and outputs are a prime ingredient of the decision basis for performance evaluation and personnel decisions.

It is everyone's job to develop a sense of quality in their own field of endeavor and to strive to do the best possible job to attain the best they can accomplish. It is management's responsibility to assist in the formulation of quality criteria and to assist each staff member to achieve the best they can do in the various enterprises in which they are engaged.

Appendix A: ACRONYMS

AEDC	Arnold Engineering Development Center
ASTM	American Society for Testing and Materials
BMDO	Ballistic Missile Defense Organization
BRDF	Bidirectional Reflectance Distribution Function
BXRI	BMDO Transfer Radiometer I
BXRII	BMDO Transfer Radiometer II
CBW	Chemical Biological Weapons
CCPR	Consultative Committee on Photometry and Radiometry
CIE	International Commission on Illumination
CORM	Council for Optical Radiation Measurements
DNA	Deoxyribose Nucleic Acid
DOD	Department of Defense
DUV	Deep Ultraviolet
EOS	Earth Observing System
ESB	Electrical Substitution Bolometer
EU	European Union
FTIR	Fourier Transform Infrared
FTXR	Fourier Transform Transfer Radiometer
HACR	High Accuracy Cryogenic Radiometer
IR	Infrared
IR SIRCUS	Infrared Spectral Irradiance and Radiance Calibration with Uniform Sources
ISS	International Space Station
LBIR	Low Background Infrared
LED	Light Emitting Diode
L-I	LaGrange point I
MBIR	Medium Background Infrared
NASA	National Aeronautics and Space Administration
NCSL	National Conference of Standards Laboratories
ND	Neutral Density
NIR	Near Infrared
NISTAR	NIST Absolute Radiometer
NOAA	National Oceanographic and Atmospheric Administration
NPL	National Physical Laboratory (U.K.)
NPOESS	National Polar-orbiting Operational Environmental Satellite
NSOM	Near-Field Scanning Optical Microscopy
OD	Optical Density
OPMC	Optical Properties of Materials Consortium
RNA	Ribonucleic Acid
SCF	Spectral Comparator Facility
SED	Semiconductor Electronics Division
SFG	Sum Frequency Generation
SI	International System of Units
SIRCUS	Spectral Irradiance and Radiance Calibration with Uniform Sources
SRM	Standard Research Material
THz	Terahertz
TXR	Transfer Radiometer
VIS	Visible
UV	Ultraviolet